CLAIMS

What is claimed is:

1. A retort heating apparatus comprising:

a perimeter wall bounding a central compartment;

a partition wall disposed within the central compartment so as to separate the central compartment into at least a heating chamber and a vapor chamber, the partition wall having a plurality of spaced apart apertures formed thereon so as to provide fluid communication between the heating chamber and the collection chamber;

a plurality of spaced apart baffles disposed within the heating chamber, each baffle comprising an elongated body; and

a collection plate disposed within the vapor chamber at a downwardly curved or sloped orientation, the collection plate having lower end disposed at or adjacent to the partition wall and an opposing upper end disposed at or toward the perimeter wall.

2. A retort heating apparatus as recited in claim 1, further comprising a return slot formed through the partition wall at or adjacent to the lower end of the collection plate, the return slot providing fluid communication between the heating chamber and the vapor chamber.

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3. A retort heating apparatus as recited in claim 1, further comprising a plurality of collection plates vertically spaced apart within the vapor chamber.

4. A retort heating apparatus as recited in claim 3, wherein the plurality of collection plates divide the vapor chamber into a plurality vapor compartments, further comprising a plurality of vapor ports extending through the perimeter wall so that each vapor port is in fluid communication with a corresponding vapor compartment.

5. A retort heating apparatus as recited in claim 1, wherein the body of at least one of the plurality of baffles has a top surface and an opposing bottom surface, the bottom surface at least partially bounding a collection channel, each collection channel being in fluid communication with a corresponding aperture extending through the partition wall.

6. A retort heating apparatus as recited in claim 5, wherein at least a portion of the top surface of the body has an inverted substantially V-shaped transverse cross section.

7. A retort heating apparatus as recited in claim 5, wherein the top surface comprises a substantially planar first side face disposed in a plane having an inside angle relative to the horizontal in a range between about 55° to about 75°.

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8. A retort heating apparatus as recited in claim 1, wherein at least one of the plurality of baffles further comprises means for heating the corresponding body.

9. A retort heating apparatus as recited in claim 8, wherein the means for heating the body comprises at least one electrical heating filament disposed at least partially on or within the body.

10. A retort heating apparatus as recited in claim 1, wherein the body of at least one of the plurality of baffles has a first end and an opposing second end, an insulation plug being mounted to the first end of the body.

11. A retort heating apparatus as recited in claim 1, wherein the body of at least one of the plurality of baffles is tubular and has an interior surface bounding a chamber.

12. A retort heating apparatus as recited in claim 1, further comprising means for feeding a feed material into the heating chamber while preventing the free flow of air into the heating chamber.

13. A retort heating apparatus as recited in claim 1, wherein the plurality of baffles are disposed in a plurality of vertically stacked rows, each row being horizontally staggered relative to the adjacent vertical row.

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14. A retort heating apparatus as recited in claim 1, further comprising means for heating the perimeter wall.

15. A retort heating apparatus as recited in claim 1, wherein the perimeter wall comprises a plurality of vertically stacked modular sections.

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16. A retort heating apparatus comprising:

a perimeter wall bounding a central compartment;

a first partition wall and a spaced apart second partition wall disposed within the central compartment so as to separate the central compartment into at least a first heating chamber, a second heating chamber, and a vapor chamber, the vapor chamber being disposed between the first and second heating chambers, the first and second partition walls each having a plurality of spaced apart apertures formed thereon so as to provide fluid communication between the first heating chamber and the vapor chamber and between the second heating chamber and the vapor chamber; and

a plurality of spaced apart baffles disposed within the first and second heating chambers, each baffle comprising an elongated body having a top surface and an opposing bottom surface, the bottom surface at least partially bounding a collection channel, each body being disposed within the first heating chamber or second heating chamber so that each collection channel is in fluid communication with a corresponding aperture in the first partition wall or the second partition wall.

17. A retort heating apparatus as recited in claim 16, further comprising a collection plate disposed within the vapor chamber at a downwardly curved or sloped orientation, the collection plate having lower end disposed at or adjacent to the partition wall and an opposing upper end disposed at or toward the perimeter wall.

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18. A retort heating apparatus as recited in claim 17, further comprising a return slot formed through the partition wall at or adjacent to the lower end of the collection plate, the return slot providing fluid communication between the heating chamber and the vapor chamber.

19. A retort heating apparatus as recited in claim 16, further comprising a plurality of collection plates vertically spaced apart within the vapor chamber.

20. A retort heating apparatus as recited in claim 16, wherein the plurality of collection plates divide the vapor chamber into a plurality vapor compartments, further comprising a plurality of vapor ports extending through the perimeter wall so that each vapor port is in fluid communication with a corresponding vapor compartment.

21. A retort heating apparatus as recited in claim 16, wherein the top surface of each body has an inverted substantially V-shaped transverse cross section.

22. A retort heating apparatus as recited in claim 16, wherein the top surface comprises a substantially planar first side face disposed in a plane having an inside angle relative to the horizontal in a range between about 55° to about 75°.

23. A retort heating apparatus as recited in claim 16, wherein each baffle further comprising means for heating the body.

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24. A retort heating apparatus as recited in claim 23, wherein the means for heating the body comprises at least one electrical heating filament disposed at least partially on or within the body.

25. A retort heating apparatus as recited in claim 16, wherein the body of at least one of the plurality of baffles has a first end and an opposing second end, an insulation plug being mounted to the first end of the body.

26. A retort heating apparatus as recited in claim 16, wherein the body of at least one of the plurality of baffles is tubular and has an interior surface bounding a chamber.

27. A retort heating apparatus as recited in claim 16, further comprising means for feeding a feed material into the heating chamber while preventing the free flow of air into the heating chamber.

28. A retort heating apparatus as recited in claim 16, wherein the plurality of baffles are disposed in a plurality of vertically stacked rows, each row being horizontally staggered relative to the adjacent vertical row.

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29. A method for processing a feed material, the method comprising:

passing a feed material down through a vertically oriented heating chamber of a retort, the feed material being heated and mixed within the heating chamber so that the feed material emits a plurality of different grades of oil vapor as the feed material travels down through the heating chamber;

collecting a plurality of discrete streams of the oil vapor emitted from the feed material within the heating chamber, each discrete steam being collected along a different elevational section of the heating chamber; and

separately condensing each discrete stream of oil vapor.

30. A method as recited in claim 29, wherein the act of passing a feed material down through the vertically oriented heating chamber comprises the feed material being substantially uniformly heated and uniformly mixed along the heating chamber.

31. A method as recited in claim 29, wherein the act of collecting a plurality of discrete streams of the oil vapor comprises each discrete stream comprising at least 60% by volume a primary grade of oil vapor, the primary grade being different for each discrete stream.

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32. A method as recited in claim 31, wherein the primary grade of oil vapor is selected from the group consisting of light naphthalene, heavy naphthalene, light kerosene, heavy kerosene, light diesel, heavy diesel, residual gas and combinations thereof.

33. A method as recited in claim 29, wherein the act of collecting a plurality of discrete streams of the oil vapor comprises each discrete stream comprising at least 75% by volume a primary grade of oil vapor, the primary grade being different for each discrete stream.

34. A method as recited in claim 29, wherein the act of passing a feed material down through the vertically oriented heating chamber comprises the feed material being oil shale.

35. A method as recited in claim 29, further comprising separating the feed material by size prior to passing the feed material into the heating chamber so that the feed material has a maximum diameter in a range between about 2 mm to about 10 mm.

36. A method as recited in claim 29, further comprising washing the feed material prior to passing the feed material into the heating chamber.

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37. A method as recited in claim 36, wherein the feed material is washed so as to remove at least a portion of the minerals within the feed material, thereby increasing the porosity of feed material.

38. A method as recited in claim 29, further comprising drying the feed material so that the water content of the feed material is reduced to less than at least 5% of the total weight of feed material and water.

39. A method as recited in claim 29, further comprising heating the feed material to a temperature of at least 100° C prior to passing a feed material down through the heating chamber of the retort.

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